Abstracts :

SYMPOSIUM ON ECOLOGY AND CONSERVATION OF BIRDS AND MAMMALS IN INDIA

Sponsored by

The Department of Science and Technology
The University Grants Commission
The World Wild Life Fund—India
Sir Dorabji Tata Trust
Indian National Science Academy
Indian Institute of Science

Held at

Centre for Theoretical Studies
Indian Institute of Science
Bangalore-560012
10—12 November 1977

Abstracts :

SYMPOSIUM ON ECOLOGY AND CONSERVATION OF BIRDS AND MAMMALS IN INDIA

Sponsored by

The Department of Science and Technology
The University Grants Commission
The World Wild Life Fund—India
Sir Dorabji Tata Trust
Indian National Science Academy
Indian Institute of Science

Held at

Centre for Theoretical Studies
Indian Institute of Science
Bangalore-560012
10—13 November 1977

Abstracts :

SYMPOSIUM ON ECOLOGY AND CONSERVATION OF BIRDS AND MAMMALS IN INDIA

Sponsored by

The Department of Science and Technology
The University Grants Commission
The World Wild Life Fund—India
Sir Dorabji Tata Trust
Indian National Science Academy
Indian Institute of Science

Held at

Centre for Theoretical Studies
Indian Institute of Science
Bangalore-560012
10—12 November 1977

ACKNOWLEDGEMENTS

We are grateful to the Department of Science and Technology, University Grants Commission, Sir Dorabji Tata Trust, World Wildlife Fund - India, Indian National Science Academy, and Indian Institute of Science for their financial support.

LIST OF PARTICIPANTS

1. Mir Hamid Ali
   Dean of Agriculture
   Andhra Pradesh Agricultural University
   J. Block, College of Agriculture
   Rajendranagar, Hyderabad 500030

2. Salim Ali
   Bombay Natural History Society
   Hornbill House,
   Shahid Bhagat Singh Road, Bombay 400023

3. V.C. Ambedkar
   Bombay Natural History Society
   Hornbill House
   Shahid Bhagat Singh Road, Bombay 400023

4. D.B. Bastavade
   Zoological Survey of India
   Wesdtern Regional Circle
   Pune 411005

5. Aziz Banu
   Andhra Pradesh Agricultural University
   J. Bloc, College of Agriculture
   Rajendranagar, Hyderabad 500030

6. R.K. Chandrahas
   Vector Control Research Center
   5/38 Lenin Street, Kosapalyam
   Pondicherry 605011

7. S.R. Choudhury
   Field Director
   Similipal Tiger Reserve
   Baripada, District Mayurbhang
   Orissa

8. J.C. Daniel
   Curator, Bombay Natural History Society
   Hornbill House, Shahid Bhagat Singh Road
   Bombay 400023

9. Priya Davidar
   Canowie, Coonoor 643101, Nilgiris

10. Madhav Gadgil
    Centre for Theoretical Studies
    Indian Institute of Science, Bangalore 560012

11. P.K. Ghosh
Central Arid Zone Research Institute
Jodhpur

12. Robert B. Grubh
Bombay Natural History Society
Hornbill House
Shahid Bhagat Singh Road, Bombay 400023

13. A.T. Sainath Janak
Andhra Pradesh Agricultural University
J. Block, College of Agriculture
Rajendranagar, Hyderabad 500030

14. A.J.T. Johnsingh
Dormitory Building
Bandipur, Mysore District 571126

15. J. Mangalraj Johnson
Wild Life Warden
Mandanthurai Sanctuary
Kalankarai, Railway Station Road
Shencottan 627809, Tamil Nadu

16. K.J. Joseph
Department of Zoology
University of Calicut
Calicut University P.O., Kerala

17. P. Kannan
Curator, Borivali National Park
Borivali, Bombay

18. M. Krishnan
Perunkula House
2/14 Edward Elliot Road
Mylapor, Madras 600004

19. George P. Kuruvilla
Bombay Natural History Society
Hornbill House
Shahid Bhagat Singh Road, Bombay 400023

20. B.S. Lamba
Northern Regional Station
Zoological Survey of India
13, Subhas Road, Dehra Dun, U.P.

21. Anil S. Mahabal
Zoological Survey of India
Western Regional Station
Pune 411005

22. D.N. Mathew
Department of Zoology
University of Calicut
Calicut University P.O., Kerala

23. Lalit Mistry
Department of Zoology
Faculty of Science
M.S. University of Baroda, Baroda-2

24. S.M. Mohnot
Department of Zoology
Faculty of Science
The University of Jodhpur, Jodhpur 342001

25. S. Murali
Assistant Professrr of Zoology
Ayyanadar Janaki Ammal College, Sivakasi

26. Ramesh M. Naik
Department of Zoology
Faculty of Science
M.S. University of Baroda, Baroda-2

27. P. Viajyakumaran Nair
Centre for Theoretical Studies
Indian Institute of Science, Bangalore 560012

28. M.L. Narang
Northern Regional Station
Zoological Survey of India
13, Subhas Road, Dehra Dun, U.P.

29. T.C. Narendran
Department of Zoology
University of Calicut
Calicut University P.O., Kerala

30. S.G. Neginhal
Curator
Mysore Zoo
Mysore

31. K.N. Panicker
Vector Control Research Centre
5/38 Lenin Street
Kosapalyam, Pondicherry 605011

32. Ishwar Prakash
Central Arid Zone Research Institute
Jodhpur

33. K.S.R. Krishna Raju
Spoonbill House, C.B.M. Compound
Visakhapatnam, A.P. 530003

34. M. Anand Rao
Andhra Pradesh Agricultural University
J-Block, College of Agriculture
Rajendranagar, Hyderabad 500030

35. B.S. Bhima Rao
Department of Zoology
Manasa Gangotri, Mysore 570006

36. M.A. Reza Khan
Bombay Natural History Socity
Hornbill House
Shahid Bhagat Singh Road, Bombay 400023

37. H.B. Devraj Sarkar
Department of Zoology
Manasa Gangotri, Mysore 570006

38. H.C. Sharatchandra
Centre for Theoretical Studies
Indian Institute of Science, Bangalore 560012

39. E.A.A. Shukkur
Department of Zoology
University of Calicut
Calicut University P.O., Kerala

40. C.M. Singh
Director
Indian Veterinary Research Institute
Izatnagar, U.P.

41. T.G. Manmohan Singh
Andhra Pradesh Agricultural University
J. Block, College of Agriculture
Rajendranagar, Hyderabad 500030

42. M. Suvarnalatha
Department of Zoology
Manasa Gangotri, Mysore 570006

43. B.S. Thyagaraja
Department of Zoology
Manasa Gangotri, Mysore 570006

44. A.K. Tyagi
Northern Regional Station
Zoological Survey of India
13, Subhas Road, Dehra Dun, U.P.

45. V.S. Vijayan
Kerala Forest Research Institute
Trichur 680007, Kerala

46. Romulus Whittaker
Madras Snake Park, Guindy Deer Park
Madras 600022

47. V.J. Zacharias
Department of Zoology
University of Calicut
Calicut University, P.O., Kerala

A B S T R A C T S

OBSERVATIONS ON THE FOOD AND FEEDING HABITS OF BAYA WEAVER (PLOCEUS PHILIPPINUS)

Mir Hamid Ali, T.G. Manoman Singh, Aziz Banu, M.Anand Rao and A.T.Sainath Janak

Studies concerning the food and feeding habits of adult Baya Weaver (Ploceus philippinus) on Sorghum and Paddy crops in field; gut content analyses; food preference in caged condition and estimation of Baya population and the grains consumed per hectare area in the field were conducted during the period July 1975 to June 1976, by the Scheme for studies on Biology and Control of Bird Pests (A.P.A.U.-I.C.A.R.) Project, Rajendranagar, Hyderabad.

The feeding habits and population counts of Baya in the Sorghum and Paddy fields were studied in Kharif and Rabi 1975-76 at Agricultural College Farm, Rajendranagar, and surrounding cultivator's fields respectively. The peak hours of the bird's visit were observed to be 6 to 10 a.m. and 3 to 6 p.m.

Baya weaver, in groups of 2 to 7 visited the Sorghum crop in milky and early dough stages and damaged earheads by picking the individual grains from spikelets, leaving the glumes intact. Two to ten grains were picked up by a Baya in a single sitting, under unscared conditions.

In paddy nurseries, the Bayas fed on exposed germinated and ungerminated seeds and at the vegetative phase the young leaf blades were cut into small strips for nest construction. Later Baya in groups of 2 to 7 visited the Paddy fields during the milky to hard grains stages of the crop and picked up the individual grains, rendering the panicle chaffy.

The gut content analyses of adult Baya revealed that in 94.65% of population dissected, stomach contained only grains of rice, sorghum and ragi; pollen, anther grains and tender leaves of paddy. In the remaining 5.35%, stomach contained grass hoppers and other insect parts, mixed with Sorghum and Rice grains, weed seeds and sand particles. These findings lead us to the inference that Baya adult, in this area is mostly grainivorous in food habit.

Amongst paddy, sorghum and bajra grains offered in cage (in the laboratory) Baya preferred paddy followed by Bajra and Sorghum, the average quantity consumed per day per bird, being 5.50 gms., 1.11 gms. and 0.76 gms. respectively.

On the basis of observation in Sorghum and Paddy fields, assessed Baya population visiting the one hectare area of these crops is 138 (Kharif) and 942 (Rabi) consuming 1.260 kgs. and 7.160 kgs. of Sorghum grains and in Paddy, Baya population is 140 (Kharif) and 123 (Rabi) consuming 12.177 kgs. and 9.658 kgs. calculated on the basis of food consumption in cage (in the laboratory).

2

ABNORMAL NESTS IN THE BAYA WEAVER BIRDS
(PLOCEUS PHILIPPINUS (LINNAEUS) COLONY)

V.C. Ambedkar

Why and how abnormal or multi-storeyed nests of the Baya weaver bird (Ploceidae : Ploceus philippinus) are found in certain colonies only and almost never in others has been open

to speculation for long. During the field study in the Kumaon terai in August 1974, I came across a very unusual breeding colony on a lofty tree Mitragyna parviflora (Rubiaceae) where there were nearly half the nests of abnormal forms. Looking at the colony I was impelled immediately to study the causes, if any, for such large abnormality. There were in all 186 nests comprising both normal and abnormal, with total number of 326 egg-chambers. Moreover, there were 55 half-finished nests for accommodating unmated females. I observed a six-storeyed nest one below the other whose total length was 160 cms. i.e. 5 ffet and 3 inches. Eleven nests forming a composite unit fused with each other.

In all 46 birds (2000, 2500, 1 = 0) were ringed with coloured rings in addition to the aluminium rings of the Bombay Natural History Society.

It was observed that the hyperstructures to the nolrmal nests were added by the original builder. In composite unit, three males were observed to bebuilding their nests. These nests were actually fused together to form a single structure. In one case, where two nests were in physical contact, they were occupied by two different females.

A snake Ptyas myoosus was frequently found to be visiting the colony regularly to devour eggs and young.

It is suggested that predation, polygamy, played an important role in the formation of abnormal nests. A large

compact giant structure seems probably to be a measure to divert attention of the predator, thereby saving, to some extent , late born young. Probably it is also a solution to the shortage of nest sites.

3

SESSONAL CHANGES IN BODY WEIGHTS OF SOME SOUTH INDIAN RODENTS

R.K. Chandrahas

The observations recorded on the seasonal changes in body weights of four species of wild rodents inhabiting the Peninsula i.e. the Indian gerbil Tatera indica hardwickei (Gray), the soft furred field rat, Rattus m. meltada (Gray) the brown spiny mouse, Mus p. platytherix (Bennett) and the little Indian field mouse Mus b. booduga (Gray) has been presented in this communication. The studies were carried out in the neighbourhood of Kolar Town (Karnataka State) between 1968 and 1972. The mean body weight with standard deviation and range as well as t-test has been analysed for 812 adults of Tatera i. hardwickei, 548 specimens of Rattus m. meltada, 725 specimens of Mus p. platythrix and 1202 specimens of Mus b. booduga. Sessonal fluctuation in body weights was observed in all the four species of rodents. In rodent species preferring drier regions (T. indica, Mus p. platythrix and Mus b. booduga) a depression in mean body weights was demonstrated in both the sexes during the summer months (April to June) and attained higher level during the period September-January. In case of Rattus m. meltada a

species which prefers irrigated fields (paddy), two peaks were observed; one major in June and another minor in October. It is considered that the breeding season of the rodents and the availability of food in the field are the important factors responsible for the fluctuation in the body weight.

4

KHAIRI, BOOK I

S.R. Choudhury

The female tiger cub, Khairi, was adopted into the family of Shri S.R.Choudhury at the estimated age of two months, on October 5, 1974 and brought up in various parts of Simpipal Tiger Reserve. A careful record of all her activities has been maintained from the day of adoption to September 1977, and the present paper deals with some aspects of tiger ethology as revealed by these observations. Her preferences of food in descending order are langur, macaque, chital, sambar, muntjac four-horned antelope, goat, porcupine and beef. She does not touch cat or fox. Most birds are palatable but crows are rejected. Khairi can make her way in forest exceedingly well, using her nose, ears and eyes. She has an innate tendency to stalk, and any movement releases persuit. She avoids making a frontal attack. While stalking the tail is moved gently, while the body is immobile, the tail serving to induce movement in the quarry. Her search for prey is in expanding loops with linear probes. Smell of her bedding alerts the prey. While

searching for prey the nose is used for following the spoor till the prey comes in sight. Khairi did not make any kills until she changed her milk dentition between 8-9 months of age. Khairi marks her territory with urine, in which lipids have appeared since the age of seven months. The marks are made by squirting since the age of 13 months. The pheromone in the urine is a mixture of two amines. Khairi's eyes can function well both in daylight and at night. She appears to enjoy colourful scenery. She has excellent memory for visual, auditory as well as olfactory stimuli. She is attracted by perfumes and drawn to phenyl, She shows considerable affection towards her human as well as animal companions. Snakes are the only animals the tigress appears afraid of. She has learnt to be hand-fed, and although she may make kills, she waits to have the meat dressed and fed to her. Feeding is invariably followed by a thorough licking. She was induced into oestrus by the smell of paints and varnish. She can tolerate long periods of hunger, and eat large quantities of meat at a time. The tigress seems to drop her faeces in water or in holes, hence scats are not a reliable index of tiger population. This multiple and multifaceted study is a kind of intimate study which had never been done in history and may not be repeated again. No opportunity is allowed to slip. Hopefully, nothing may hamper it till its natural end. For the future years alone hold the promise of confirmation of what Khairi's past has indicated and much more to learn for the benefit of the tiger, better implementation of Project Tiger and socio-ecological rationalisation for the coexistence

of the tiger and the human beings like it had been in yester years of the rich natural life in our rural homes in forested lands.

5

SOME NOTES ON THE PLANT PARASITE LORANTHUS AND ITS HOST PLANTS IN THE NILGIRIS

Priya Davidar

The Nilgiri Plateau lies between latitude 11°8' and 11°87' North, and longitude 76°27' and 77°4' East. The plateau receives the south-west monsoon, and the north-east monsoon. The flora of this region is rich and varied. The Nilgiri District supports 18 species of the semi plant parasites belonging to the subfamily Loranthoideae of the family Lorahthaceae (B.D.Sharma 1975), indicated in this paper by the general term loranthus for the sake of convenience.

The distribution of loranthus is influenced by climate and altitude. Different species of loranthus differ in their choice of habitat. This, to an extent limits the choice of host plants for a certain species of loranthus , though certain species of loranthus are highly adaptable to different environmental conditions.

It is found that within certain heterogenous forest types, certain loranthus are highly host selective. Reasons are sought that may help to explain this selectivity. Biochemical incompatibility, failure of the parasite's haustoria to penetrate certain hosts, light and shade requirements of the loranthus

could be put forward as major reasons that account for host selectivity in a loranthus. The dispersal agent of the loranthus, the bird, could also play an important role in determining the host species. The major agent of dispersal in the Nilgiris is the Dicaeum, or flowerpecker. Though some evidence has been obtained to support this view, more study is needed in this direction.

The light or shade requirements of different species of loranthus, may limit them to host species that are able to provide the required light or shade.

Whether a high degree of host selectivity is advantageous to the loranthus, especially in a heterogenous forest is open to question , though loranthus with high range of hosts species appear more successful. A dispersal system that successfully transfers the seed to the right host plant would be to the advantage of a host selective species.

It may be that the whole question of varied or limited host range may be tied to other aspects of the biology and evolution of this extremely fascinating parasite.

6

THE GRIFFON VULTURES OF GIR FOREST: THEIR FEEDING HABITS, AND THE NATURE OF THEIR ASSOCIATION WITH THE ASIATIC LION

Robert B. Grubh

The paper deals with a few aspects of the feeding habits of Griffon Vultures, the extent of their appropriation of Lion

kills and the probable food competition between Vultures and the Lion in the Gir Forest.

The birds visited carcases of domestic livestock as well as of wild animals, including water buffaloes, zebu cattle, camel, chital and nilgai, but the domestic cattle and buffaloes formed their chief source of food.

The accesssbility of Vultures to carcasses depended on three major factors, namely (1) Visibility of carcasses from the sky, (2) Vulture take-off space, and (3) safety from predators. When any one of the above factors was in the nagative, Vultures did not come down to feed. In the monsoon the visibility and take-off space are greatly reduced because of dense vegetation. This should affect the food supply of Vultures. However, the arrival of additional cattle into the Gir during the monsoon releases further supply of carcasses into the forest. Vultures take longer time to demolish intact carcasses with tough hide, but skinned or partially opened-up carcasses are consumed within minutes. After the initial scramble for food many birds temporarily move away thus enabling the late comers and the weaker ones to feed.

Vultures infreqnently appropriated lion kills. But the extent of appropriation was significantly altered by interference from some local people who collect animal hide. Under natural conditions the lion utilised most of its kill and permitted vultures to consume only what they abandoned. But when man interfered vultures found it easier to approach the kills and

partake of it. The observations point to the conclusion that competetion for food between the lion and the Griffon Vultures is rather insignificant in the Gir, just as in the African forests. But here the human influence comes in, and when man competes with the lion, the situation changes drastically and the vultures, together with man, take a considerable portion of the lion's legitimate food.

7

A PRELIMINARY STUDY ON THE PEAFOWL, PAVO CRISTATUS (LINN) OF INJAR

A.J.T. Johnsingh and S. Murali

The distribution of the Peafowl, Pavo cristatus (Linn) in India, though uneven, ranges from the Himalayas to the southern most districts. In Tamilnadu, Ramanathapuram and Madurai districts abound in peafowl. This report presents data on some aspects of the ecology and behaviour of the peafowl in Injar, a small hamlet, 4 miles west of Sivakasi (9° 40' N, 77°69' E) in Ramnad District. This village has a rain fed tank and about 100 hectares of cultivable land. These birds roost on 5 banyan trees including a magnificent one adjoining the Aladi Eswaran Temple.

The study was carried out during the pre-reproductive period (September), the reproductive period (October, November and December), and the post reproductive period (January, February and March). 14 times the study area was visited. The total counts method was followed as the birds came to roost. The ratio of the adult females and males, 134:73, is at variance

with the sex ratio observed by Sharma (1972) at Jodhpur (170-2100 : 1000); the approximate population of breeding females formed 31% of the total peahen population. There was harem formation by the males (males with train) in the reproductive period and the sexes began to wander separately at the end of breeding season.

At Injar, the birds were observed to feed on paddy, chillies, groundnut, tomato, and banana bunches causing least damage to the fingers of bunches. An examination of the crop contents of 3 birds showed the peafowls to be mostly primary consumers.

According to our observation the vocalization of both adults and chicks consisted of an inscribable long call and a short call which was very difficult to record. The vocal repertoire of the peafowl, has more calls for flocking, group movement and for alarming the flock than for other activities. The diffe rent calls made by the peafowl and the context in most cases were also recorded.

The breeding season at Injar started in September and continued into October as this period happens to be the rainy season there. This differs from what Ali & Ripley (1969) have recorded for South India as the breeding season for peafowl, i.e. April and May. Our observation as well as Sharma's (1972) emphasize the need for a good rainfall for the successful begi-nning of the breeding season. During September males were seen dancing mostly alone, twice before females and once before two

onlooking males. The dancing, a courtship display before may be explained as a form of showing dominance. In the study area the males started shedding their tail coverts at the end of October and most of them had lost their train by the middle of January.

Peafowls, at Injar, laid their eggs amidst paddy and sugarcane cultivation as they had protection from local people on religious grounds. In addition thorny shrubs also afforded them possible sites for brooding.

Though a hen with 3 to 5 chicks is common, at Injar, there was an instance of 6 chicks accompanying a mother. Chicks below 30 days old were rarely seen and mortality during the early post hatching period was high.

The peafowl of the area bothered little about maintaining territories. While feeding or aseembnling to roost, they were peaceful and various interactions observed, involved only chasing, pecking or mere challenging, avoiding violence. A few interactions with other animal species of the area were olbserved.

In Injar poaching, destruction of eggs by children, killing made by pie-dogs and destruction of thorny shrubs needed for egg laying and brooding, pose a threat to the peafowl.

For preserving the National Bird, a statewide population study, the involvement of local educational institutions and officials in the preservation job, and planting thorny shrubs to increase brooding sites in those areas may be undertaken.

8

THE STATUS, ECOLOGY AND BEHAVIOUR OF LION-TAILED MACAQUE

J. Mangalraj Johnson

The lion-tailed macaque (Macaca silenus) inhabits the more inaccessible, dense evergreen forests of Western Ghats between 600 and 1050 m. in Karnataka, Kerala and Tamilnadu. It is a highly arboreal animal with a short, tufted tail, and moves in a deliberate, slow fashion. The different troops follow regular pathways along trees. They consume leaves, leaf buds, fruit, insects and lizards. They sleep in trees huddled together with a single troop breaking up into 2-3 sleeping clusters. Mating is from behind, and 3 instances of the leading male continuously copulating with oestrous females were noticed. The vocalisation includes "coo", "krubb", "squeak", "squeal" and "scream" sounds.

9

NECTAR-FEEDING ADAPTATIONS OF FLOWER BIRDS

P. Kannan

The 37 species of flowerbirds of Bombay area are of two types: (1) Non-specialized nectar feeders with licking type of bill and tongue, and (2) Specialized nectar feeders with suctorial bill and tongue.

Adaptations of nectar feeding are: comparatively long, slender bill (as compared to body size), reduction of bill-hook and notch (bill with a sharp tip), reduction or absence of rictal and nasal bristles, tubular tongue (by the curling in of margins);

bifid tongue tip; fraying of the anterior tongue margins to make the tip brush-like, and increased protrusibility of the tongue.

Of the nine species of nectar feeders studied, only sunbirds combine the most highly evolved structural adaptations for nectar-feeding (resulting in inability to feed on fruits and consequent increased need of nectar) with the ability to make use of the nectar of the largest number of flowers, including those not adapted to receive their visits.

The short-cut method of nectar feeding is a behavioural adaptation of high selective value which has possibly enabled sunbirds to develop highly evolved bill and tongue for nectar feeding and has compensated for the evolutionary ill effects of high specialization to a relatively narrow food niche.

10

THE AVAILABILITY OF NESTING MATERIALS AND NESTING SITES AS A VITAL FACTOR IN THE GREGARIOUS NESTING OF INDIAN WATER-BIRDS

M. Krishnan

Basic general considerations: Instinctive urges/preferences determining the choice of nesting sites and trees or other plants : insulation by water and other protective potential of the nesting site : physiological factors conditioning the getting into breeding condition, mainly assured for supply : gregarious roosting even when not breeding at such nesting sites: the survival value of congested nesting : freedom from human

predation and other unnatural forms of predation : versatility in the choice of nesting sites and plants : the utilisation of the nest for raising successive broods during each nesting season, and the replenishment of the nest and lining materials.

More specific considerations: The foundation potential of nesting trees and plants utilised in various locations : the need for thorny twigs as the foundation of the nest itself : less thorny inner twigs and lining materials --mainly green leaf or thalloid algae-- employed not too skilfully : the raft nests of white ibises : the tendency of storks and spoonbills to form communities at mixed heronries : the communal nesting of grey pelicans : the employment of available green material for the inside of the nest and its probable thermal nsulation potential : insulation from pricks by thorns, too ? : the striking contrast between the abilities of the birds to gather food and nesting materials and their dependence on local nesting material.

Lack of adequate and natural supply of (or availability of) nesting materials a very likely cause of the abandoning of old nesting sites and of the deterioration of water-bird sas. in India : the need to ensure adequate shrub area around water-bird sas.

Incidental observations and conclusions (tentative conclusions).

11

ECOLOGY OF BONNET MACAQUE MACACA RADIATA WITH SPECIAL REFERENCE TO FEEDING HABITS

George P. Kuruvilla and J.C. Daniel

The aim of the study was to obtain information on the food habits, habitat utilization, home range, activity pattern, population structure and behaviour of Bonnet Macaque under natural conditions.

The study was conducted in Elephanta Island near Bombay. Two troops of bonnet macaques occur here: The 'Caves Troop' and the 'Forest Troop'. The Forest troop on which intensive study was made, depended entirely on natural food whereas the 'Caves troop' obtained a good proportion of its food from visiting tourists.

The study troop preferred tall trees with dense foliage for roosting. The animals leave the feeding grounds by about sunset and head for the roosting place. Of the 171 species of plants recorded on the island, 31 species were eaten by the macaques. In addition they also fed upon a variety of animal food.

The feeding rhythm showed two peaks during the day. The animals preferred different food items in different months. Different age classes showed different food preference.

Feeding commenced early in the morning. They fed in groups. However the males, particularly the dominant ones, preferred to feed alone though not far from the troop.

Bonnet Macaques are selective feeders, consuming certain parts of certain fruits. They store food inside the cheek pouches when they are in a hurry to leave the site. While feeding in the open fields, they cover wide areas in search of grass hoppers and other insects by lifting small stones and or by walking slowly through the grass to catch flies and grass-hoppers. On many occasions it was noticed that the monkeys chase flying insects also. An animal was also noticed feeding on a Calotes lizard.

12

A CONTRIBUTION TO THE ECOLOGY OF INDIAN PIED MYNA, STURNUS CONTRA CONTRA LINNAEUS : PART I : FEEDING BIOLOGY

B.S. Lamba, M.L. Narang and A.K. Tyagi

Mynas are considered to be the friends of the farmers. As these birds feed on cereal grains and fruit and also on insects injurious to agriculture, it was considered worthwhile to assess the exact role played by them vis-a-vis agriculture.

Jerdon (1862) laid the foundation of food-habits studies in India. Mason and Lefroy (1912) made an outstanding contribution by studying the food of 112 species of birds collected at Pusa (Bihar). Some other workers like D'Abreau (1918), Hussain and Bhalla (1937) , Berrsford (1944), Simwat and Sidhu (1974, 1975) and Mukherjee (1966-76) have also contributed to our knowledge on the subject from time to time. But our present day knowledge of the food and feeding habits of a vast majority of birds is still negligible.

The study was carried out in and around the city of Dehra Dun. Pied Mynas were coleected (shot) during and just after the feeding time, between 08.30 hrs. and 10.30 hrs. during summer and between 09.00 hrs. and 11.00 hrs. during winter. In all crop contents of 137 specimens were analysed.

Todate three methods have been used by various workers to determine the food of birds quantitatively.

1. Numerical method; 2. gravimetric method;
3. Volumetric method.

For analysing the animal diet we have followed a combination of numerical and volumetric methods and for vegetable diet we used a combination of numerical and gravimetric methods.

The analysis of crop contents of Indian Pied Myna revealed very interesting results. Specimens collected from Scrub showed that they have taken 100% of lantana berries. Only 2.2% of birds took 100% of wild seeds. 5.1% of birds had taken a diet consisting 100% of ants (Pheidole sp.). Birds collected from cultivated areas during sowing season have taken wheat to the extent of 28% by weight. But the number of such birds was very low (4.5%). On the other hand birds collected from Scrub in the same season had taken 100% insect food. Analysis of the individual gut contents revealed maximum intake of earthworms (86%) followed by beetles and grubs (69%), catterpillars (60%) grasshoppers (59%), molluscs (57%), bugs (30%) and frogs (30%).

Out of 137 examples, 10.5% were positive for lantana berries, 5.1% for earthworms, 50% for beetles, 13.1% for catterpillars and grubs, 11.5% for wasps, bee and ants and 8.3% for bugs. 18.2% were positive for molluscs.

The foregoing results showed that these birds mostly feed on insects, catterpillars, grubs, lantana berries, molluscs and earthworms. Only a negligible number of birds had taken wheat during k sowing season. During the rainy season these birds may be said to cause a bit of harm to farmers by feeding on earthworms.

Hence it can be safely concluded that Indian Pied Myna is much more beneficial to agriculture than it is harmful.

13

POPULATION AND ROOSTING BEHAVIOUR OF MIGRATORY ROSY PASTOR (STURNUS ROSEUS) IN POONA

A.S. Mahabal and D.B. Bastavade

The rosy pastor is one of the earliest and most abundant winter visitors to the Deccan plateau. Six of its roosts were observed over a period of three successive years in Poona, Maharashtra. The roosts are all on large trees, in undisturbed localities. The rosy pastor always roosts in the company of one or more of the following species: Indian myna, brahminy myna, house crow, jungle crow, roseringed parakeet and cattle egret . The rosy pastor arrive in Poona in the first week of October, but the population is particularly high in March-April. No rosy pastors are noted between June and September. Only one of the six roosts is occupied permanently over this entire period. In comparison with the other species at the mixed roosts, the rosy pastor arrive early, always before sunset. They come between 35 to 10 minutes with a peak at 20 minutes

before sunset in autumn, and 45 to 5 minutes, with a peak at 30 minutes before sunset in spring. In spring they arrive in much larger flocks as compared with autumn. In spring the flocks show a variety of pre-roosting communal aerial displays.

14

A COMPARATIVE STUDY OF THE FEEDING HABITS OF CERTAIN SPECIES OF INDIAN BIRDS AFFECTING AGRICULTURE

D.N. Mathew, T.C. Nrrendran and V.J. Zacharias

This paper is the result of a very limited preliminary study of the food and feeding behaviour of certain common species of Indian birds affecting agriculture. There was much overlap in the items of food between different species. In the Baya Weaver bird, the Little Brown Dove and the Spotted Dove, Paddy was the most important item of food followed by several millets. All the three consumed 10-15 varieties of weed seeds also, with each species having some unique item which it took more often. Seeds of Ragi and Croton sparsiflorus were important to the doves and those of Panicum repens to the Baya. The latter could pick grains from the ground as well as directly from panicles of standing paddy whereas the doves could take only the grains found on or close to the ground. The adult Baya took more of grain than animal food whereas its nestlings were given many animal items. Among the really carnivorous birds examined insects of Orthoptera and Coleoptera were preyed upon by the Pond Heron, the Small Green Bee-eater, the Black

Drongo, the Common Myna the Southern Indian Roller, the White headed Babbler and the Large Pied Wagtail. Odonate nymphs were the most common item of food of the Pond Herons which also took crabs, flies and tadpoles. Beetles crickets and grass-hoppers were the important items of food of the roller which also took small toads, termites and skinks. Flying forms of hymenoptera, diptera and odonata were the chief items of food of the bee-eater. Adult coleoptera, hemiptera and orthoptera were the main food items of the drongo and adult coleoptera and orthoptera in the case of Common Myna, the Whiteheaded Babbler and the Large Pied Wagtail. The Myna and the Babbler consumed termites, small vertebrates and seeds of several plants and the wagtails, diptera. In sum the common items of food were shared by many species of birds but each one had special items of food and characteristic feeding behaviour which kept its niche distinct.

15

ON THE PRIMATE RESOURCES OF INDIA

S.M. Mohnot

The greatest concentration of primate species of the world lies in this region , with 8 genera having 18 species and 44 subspecies inhabiting varied ecological niches. Of these, existence of the snub-nosed monkey Rhinopithecus roxellanae is doubtful. Population of the rest are either abundant, infrequent or endangered. Out of 18 Indian species, 7 are

exclusively Indian in their geographical distribution. Indian species differ considerably in their shape, size, population status and their use in biomedical research. They range from a squirrel-like tree-shrew to a large gibbon.

In spite of easy access and excellent observational opportunities, very littel work has been done on our primates. For example, we do not know the exact range of distribution of any of our species and also their population status and trend to any extent. These details are essential for any kind of research pursued on these monkeys. This situation exists in spite of the fact that our rheous is in use throughout the world since 1930. In India, primate research is in its infancy and only recently work on its ecology and biology has been started.

The rhesus export is a serious problem. It is now estimated that in the last 40-50 years nearly 2 million monkeys have been exported to Europe and the USA. The uninterrupted harvest and expaort have not only resulted in population decline in its distribution zone but have also created other problems. Their frequent use in nonmedical purposes including biological-chemical warfare is a matter of concern. Though the export is allowed purely for "biomedical purposes".

In addition to the rhesus monkey, Macaca mulatta, four other other species, Loris tardigradus, Nycticebus coucang, M. radiata, and Presbytis entellus have been used in a variety of research in India in the recent past. Of these, population of

M.mulatta, M. radiata, and P. entellus is still fairly large. But, monkeys like, M. arctoides, M. silenus, and P. geei are at the verge of extinction. The other species like, Loris tardigradus, Nyctinebus coucang, and P. johnii are also under the pressure of depletion.

However, future of our several primate species is still bright. If some measures like protection of habitat, conservation, planning and management, and research on their ecology, biology and behaviour is initiated in a phased manner, the primate stocks of the country can be maintained for a sustained yield on a long range basis.

16

BREEDING SEASON IN A TROPICAL POPULATION OF THE HOUSE SPARROW

Ramesh M. Naik and Lalit Mistry

The breeding of Passer domesticus indicus in nest-boxes placed in the university campus at Baroda (Long. 73° 13' E, Lat. 22° 18' N), India, was studied from 1969 to 1973.

The breeding was sporadic in the cool dry period of winter (November to January). Intensive breeding occurred during the 'breeding season' which spanned almost the whole of the period of summer (February to May) as well as the warm-wet period of monsoon (June to October). The breeding season was divided into two or three distinct breeding periods. Between the successive breeding periods there occurred a short 'inter-breeding period', when the breeding activities were excluded.

The inter-breeding periods occurred during the monsoon, so that the breeding was continuous during the summer, but restricted to relatively shorter breeding periods during the monsoon. The females ringed for individual recognition bred several times during a year and their breeding pattern corresponded with that of the population. A female sparrow on the average laid 6 to 7 clutches annually. The cases of individual females laying as many as 6 successful clutches/year have been recorded. The interval between the successful clutches was 38 days.

The breeding season started when the mean air temperature rose to about 24 to 25°C in February. Difference between the earliest and the latest dates recorded for the start of the breeding asason was of 13 days. The interbreeding periods occurred when bad rainy weather prevailed. The longer inter-breeding periods because of the heavy rains in the monsoon tended to prolong the breeding season, so that the termination of the breeding season in different years varied by as much as forty-five days. The average number of clutches laid by a female sparrow during a year depended upon the amount of rain in the previous year as well as the rainfall during the year in question.

17

THE STATUS OF ELEPHANT POPULATIONS OF KARNATAKA

P. Vijayakumaran Nair and Madhav Gadgil

The Western Ghats constitute one of the best remaining habitats for the Asiatic elephant (Elephas maximus). The

northern half of the distribution of elephants on the Western Ghats falls in the State of Karnataka. This area was surveyed over a period of six months between July 1975 to July 1977. The distribution of elephants in the State may be devided into the following five areas: (a) North Kanara (b) Crest line of the Ghats (c) Malnad (d) Mysore Plateau and (e) Kollegal Hills.

(a) The region of North Kanara is a vast forested area with a small number of surviving elephant herds. The elephants are largely restricted to moist deciduous forest in this region. There are at present four surviving herds, many of them reduced to one or two solitary males. A fifth herd in the Yellapur-Sirsi area was completely exterminated about thirty years ago.

(b) The region of the crest-line of the Ghats covers the heavy rainfall regions from Nagavalli in north to Coorg in south covered with ever-green, semi-evergreen and moist deciduous forests, The elelhant distribution is highly patchy and there are only four small herds. These populations appear to occupy a suboptimal habitat having been driven out of the moist deciduous forests they favour.

(c) The region of Malnad lies to the east of the crest-line and is covered by moist and dry deciduous forests. This must at one time have been optimal eleohant habitat but has been now heavily disturbed by two major irrigation projects. There is a good population of about 50-60 elephants in the Hebbe-Muthodi-Lakvally area and three small herds scattered over the rest of the region.

(d) The undulating Mysore plateau is covered largely by moist and dry deciduous forests and has a very high concentration of elephants perhaps numbering over one thousand animals. These seasonally migrate into Kerala and Nilgiri Wynaad areas. Within Karnataka they range over Bandipur National Park, Nagarhole and Nugu wild life sanctuaries and are relatively well protected.

(e) The undulating hilly country of Kollegal lies to the east of Western Ghats proper and is covered mostly by dry deciduous and scrub forest and adjoins the same kind of forest in the State of Tamil Nadu. This area harbours a fairly good population of elephants numbering around 200.

The total estimate of the elephant pooplation for Karnataka is thus in the neighbourhood of 1300 animals. The bulk of this is concentrated in the sanctuaries of Bandipur and Nagarhole. Everywhere else the elephants are rather scattered. They come everywhere into severe conflict with cultivators whose farms lie in the middle of or immediately bordering elephant forest areas. A number of elephants in these areas are killed by the cultivators as well as by the ivory poachers.

Elephant populations can probably be protected on the Mysore plateau, Hebbe-Muthodi-Lakavally and Kollegal areas. The other scattered populations appear doomed to extinction and the only solution seems to lie in capturing them for forest work and for zoos instead of allowing them to be slowly shot out one by one in near future.

18

ECOLOGICAL IMPACT OF AFFORESTATIONS AT THE RANIBENNUR BLACKBUCK SANCTUARY

S.G. Neginhal

The Ranibennur forests in Dharwar district of Karnataka were presumably in their climatic climax as scrub forests in 1895. The forests were extracted and were reduced to vast grass-lands between 1925-1955. The wild life was also totally exterminated by this time. Extensive contour trenching and planting of quick-growing species, along with protection against grazing was introduced after 1956. This allowed the establishment of good grass growth and shelter, and by 1971 some six hundred blackbuck lived in this area. The Indian wolf was also cited in 1973, and the great Indian bustard increased from one or two to fifteen by 1974. Mechanized afforestation replaced manual work after 1972. The distance between trenches was reduced, the grassy areas destroyed and the ground covered rapidly by the growth of Eucalypts. This has destroyed indigenous flora and forced backbucks onto the farmland.

19

ECOLOGY OF HOLE NESTING BIRDS

K.N. Panicker and J.C. Daniel

India has a rich avian fauna with varied nesting habits. All or a majority of species of the families: Picidae, Capitonidae, Bucerotidae, Sittidae, Psitaacidae, Coraciidae, Strigidae, Upupidae and Sturnidae are hole nesters. Their

nidification is generally known, but no comparative studies of species of different families using a common ecological niche has been studied so far.

An attempt has been made to make a comparative study to compare the breeding habits of the primary hole nest builders like Psittacula krameri (Scopoli) Megalaima haemacephala (Muller) and the secondary users like Coracias benghalensis (Linnaeus), Acridotheres tristis (Linnaeus), Sturnus pagodarum (Gmelin) and Petronia xanthocollis (Burton), As all these birds breed under the same ecological conditions emphasis is given to intra species competition and breeding success.

20

HUMAN-ANIMAL INTERACTIONS IN THE RAJASTHAN DESERT

Ishwar Prakash and P.K. Ghosh

Archaeological and historical evidences indicate that the desert region of rajasthan had, in the past, a varied fauna which has almost wholly vanished in course of time, Larger mammals like the Asiatic lion, the panther and the wild boar would seem to be the more prominent casualities. The depradatations of man have been principally responsible for the gradual disappearence of the desert's faunal heritage. However, some of the erstwhile rulers of princely states were, fortunately, conservation-minded as is evident from the several wildlife sanctuaries created and nurtured by them. This is an invaluable legacy of the faudal system. A desert community - the Vishnois - has been zealously protecting the

black buck through the centuries. Their spirit of dedication is worthy of emulation by nature-lovers round the world.

Fortunately, the desert still has a few interesting, though endangered species left, like the Great Indian Bustard, the gazelle (Chinkara) and the antelope (Black buck). The proposal to set up a Desert National Park is a step in the right direction for the preservation of the remnants of the desertic fauna for our posterity.

21

ECOLOGICAL STUDIES ON SOME MIGRANT WADERS IN INDIA

K.S.R. Krishna Raju

The food and feeding ecology of some waders of the family charadriidae on their wintering grounds at Bharatpur in Rajssthan and point calimere in Tamil Nadu were studied. Bharatpur forms a staging post for migrant waders in their southward movement before dispersing to their normal winter quarters in the peninsula or along the Indian coastline. The extensive salt marshes of point calimere provide a gathering point for migratory waders and for migrants that visit Ceylon. Observations on flock composition, feeding associations, peck rates, horizontal distribution and moulting were made on eight species of waders.

The flock composition of different species of waders at Bharathpur seem to be distinctly different from that at point calimere . The peck rates of different species differs

considerably. Intraspecific variation among species of the genus Calidris is less than amongst species of the genus Tringa. The peck rates are probably correlated with food availability, peck success and food requirements. Peck data suggest that there is a diurnal rythm of feeding activity and at point calimere a tidal rhythm of lower intensity is superimposed on this. It is interesting that the feeding rates are highest immediately after arival and before departure i.e. during the months of October-November and February. Varying patterns of preference for shallow and deeper waters for different species, in different locations and in the tidal and non-tidal areas were observed but due to lack of data on the distribution of prey species no conclusions are possible.

22

WINTERING HABITS OF THE BLUE CHAT ERITHACUS BRUNNEUS (HODGSON), IN THE NILGIRIS, SOUTHERN INDIA

Mohammad Ali Reza Khan

The Blue Chat Erithacus brunneus was observed during two successive winters in the Nilgiris and in some other parts of the Western Ghats. The chats are one among the earliest to arrive and latest to depart from their winter quarters. They occupy every bit of shrubbery in the Nilgiris, usually above 1000 metres msl and become one of the commonest of the resident and migratory birds of these hills. Literally they do not compete with the resident species because of their preference for different habitat, roosting place, etc., and

terrestrial nature. The chats apeeared to be terrirorial and defend it both from the members of their own kind and other species. They are also parochial and live singly. Every 2.65 hectares seemed to support one Blue Chat each. They presented a very unusual sex ratio which is 50 males to one female. The chats collected all food from the ground surface and foraged systematically from one end of its terriroty to the other. They have particular time for preening and other dialy chores including mid-day siesta. The birds appeared to be vocal throughout their entire period of stay in the winter quarters.

23

A COMPARATIVE ACCOUNT OF THE AVIFAUNA OF THE SHOLAS AND THE NEIGHBOURING PLANTATIONS IN THE NILGIRIS

Mohammad Ali Reza Khan

Sufficient information is not available on the effect of clear felling of the shola type of forests and replanting the areas with Tea, Eucalyptus, Acacia, Pine and other commercially exploitable exotic plants on the avifauna of the Nilgiris (Tamil Nadu). This paper is a limited effort in this direction, Observation, sporadically spread over two years including some 100 hours of determined field work, on birds of the natural vegeration, that is the sholas growing usually above 1000 metres msl in the upper plateau of the Nilgiris, and of the bordering plantations such as Tea, Eucalyptus and Acacia was made. It showed that the natural vegetation supported a larger number of breeding, locally migratory and migratory species when compared

to the plantations, and the causes determined. The result is a definite proof of the existing opinion that exotic plantation is not favoured by the avifauna of the region. Among the plantations, in order of preference, tea seemed to provide better food, shelter and breeding place than the Eucalyptus and Acacia, whereas the Euralyptus provided better facilities over Acacia. The bird species which are most successful in different plantations have been noted and probable reasons for the success are given. It has been pointed out that the specific area in a particular existing plantation which is referred to as 'core zone' and usually being represented by the thinned out remannts of an erstwhile larger shola and gallery forest in the Tea plantation; and shrubbery and undergrowths in the Eucalyptus plantation be preserved intact. Finally suggestions were being made to stop further denudation of the ecologically complex and important shola vegetation of the Nilgiris which not only supports a sizeable population of the endangered larger mammals such as the Tiger and the Nilgiri Langur but also reptiles, and ambhibians, setting aside the varied forms of butterflies, moths and other invertebrates.

24

BANDING BATS FOR THE STUDY OF POPULATION ECOLOGY

H.B. Devaraj Sarkar, B.S. Bhima Rao, M.Suvarnalatha and B.S. Thyagaraja

Various banding methods have been employed to study the homing and migratory patterns of chiropterans. We employed a new method of neck banding to study the ecology and

reproductive behaviour of two species of microchiroptera, Rhinolopus rouxi and Hipposideros species. These two species of bats live together and roost in an underground magzine at Srirangapatna, an old historic fort 14 km. from Mysore. They were banded from April 1974 to May 1975. Studies show a wide fluctuation in the population of these bats. They do not seem to exhibit any homing instinct as revealed by the frequency of recaptures at the banding site. Both bats exhibit colour polymorphism and their colour polymorphism does not seem to be either sexual or seasonal. Contrary to reported views both male and females of Rhinolopus rouxi coexist during nonbreeding season. One of the species, Hipposideros seems to use the magzine only for breeding purpose since only pregnant and lactating bats are present there during their breeding season namely April, May and June and they disappear during the other months. The young become separated from the mother by 20 to 25 days after birth and are capable of leading independent life. They show a faster rate of growth. Rhinolopus rouxi comes to estrus during September-November period. We were not able to collect pregnant or lactating animals of this species in that magzine.

25

TIME-ACTIVITY BUDGET OF SPOTTED DEER (AXIS AXIS) OF BANDIPUR

H.C. Sharatchandra and Madhav Gadgil

The spotted deer is the dominant resident herbivorous species of Bandipur National Park of Karnataka. A detailed time-activity budget for this species has been prepared on the

basis of a full year's field observations. Bandipur receives rains from April to November with a short dry period around June and July. Spotted deer shed their antlers from September to November, are largely in velvet till March and the majority are in the hard antler stage from April to September. The fawns may be born at any time of the year but the peak of births seems to occur from December to February.

Our studies of the time-activity budget of the animals show that the time spent in feeding is very low in August, September and October; the months of maximum availability of green grass. Relatively more time is spent in feeding in the dry months from November to March; declines with the growth of fresh grass in April and May; increases again during the dry spell of June-July and remains very low in August, September and October. The amount of time spent in ruminating is inversely related to the time spent in feeding and reaches its highest value in August, September and October. High values of time spent in feeding are correlated with high values of walking, standing and scanning, licking as well as alert and alram behaviour. Play behaviour is particularly common after the first flush of green grass in April and May. It is totally absent during the dry periods from December to March. The breeding activity is concentrated in the April to November period. Rut calls are given from April to November reaching a first peak in August and a second peak in November. Mounting is noticed from June to November with peaks in August and November. Agonistic displays and fighting are absent in the

driest months and occur from April to October. Rubbing of the forehead reaches a peak in June and July and fighting a peak in August.

Spotted deer males may be classified into four size catogories A, B, C and D, in the ascending order of the size of antler. Their behaviour further differs depending on whether the antlers are in velvet, in hard antler stage or shed. During the velvet stage the males display by rubbing the forehead, but do not at all exhibit any other agonistic or dominance displays. The young A category or spike males show rubbing of antlers and forehead, some fighting and a relatively high level of play. The category B males show some rubbing of forehead and some fighting and preaching. The category C males, which are fairly large but do not appear to be at the top of the hierarchy, are maximally active in all the social displays and in fighting. No male of this or smaller categories was however noticed to mount any female. The largest males in hard antler spent the minimum time in fighting and social displays such as preaching and hitting antlers. These males do however spend more time than any other category of males in dominance and submission displays. They thus seem to have a well established hierarchy and appear to avoid fighting. These large males seem to spend the maximum amount of time in ruminating.

The females spend much more time in the alerted posture and almost exclusively give the various alram signals. They

do show displays in the form of rubbing the forehead and preaching and will also fight with their fore limbs. Only females and fawns lick each other and of course the nursing behaviour is restricted to them. The fawns also spend a large proportion of time in ruminating. They show play behaviour and also some fighting and mounting.

26

BREEDING BIOLOGY OF THE BLACK DRONGO (DICRURUS ADSIMILIS)

E.A.A. Shukkur, K.J. Joseph and D.N. Mathew

The Black Drongo, Dicrurus adsimilis is a common resident bird in the Calicut University campus. It is by and large a solitary species and prefers the open fields, lawns, and gardens around buildings. It is an arch predator of insects, watching for flying insects from suitable perches and hunting them down. It is very active during the early morning and late evening periods singing and feeding alone or in pairs.

The breeding biology of the bird was studied in the Calicut University campus during 1973-1976. A total of 65 nests were studied in the 327 ha. study area during the four breeding seasons. In the Calicut University campus the bird breeds from April to June. From December onwards the earliest phases of courtship were observed. The nest site seems to be selected between late February and early March, after which the pairs start defending the area around. The size of the territory varied from 0.3 to 1.2 ha. Nest building and egg laying were completed in nine to twelve days after the first

rain in April. In the study area the Jack Fruit trees (Artocarpus heterophyllus) were often preferred for nesting. The clutch size was three. The eggs are elliptical in shape and white in colour with red spots all over. The incubation period lasted from 14 to 15 days and the nestling period from 16 to 17 days. Both sexes incubated. The newly hatched nestlings were naked and their eyes were closed. At three to five days of age the feathers of the major pterylae emerged and at six to seven days the eyes opened. By the time nestlings were about to leave the nest their bodies were fully feathered. The fledglings were dependent on the parents for about three months. During the nestling and fledgling periods the nesting area had a fairly good supply of insect food. The parents showed strong territoriality during the incubation, nestling and fledgling periods and were very aggressive to intruders into the territory till the nestlings fledged.

In the study area many Red-vented Bulbuls (Pycnonotus cafer) nested in the terriroty of, and at times on the same tree as the Black Drongo. Forty-four percent of the eggs laid by Black Drongo produced flying young. The breeding success of the bird was found to be intimately related to the nature of rainfall. Apparently the vigorous defense of the terriroty by the adult also contributed to the fairly high rate of nestling success in this drongo. However it must be remarked that the population of the Black Drongos in the Calicut University campus is gradually declining as an inevitable consequence of the developmental activities on the campus.

27

HEALTH PERSPECTIVES FOR WILD LIFE CONSERVATION

C.M. Singh

A number of factors related to physical and biological characteristics of ecosystems are generally recognised and have received attention. There is, however, little knowledge and appreciation of the role of highly contagious and fatal epizootics, some of which affect a wide range of snimal species over large areas, in the population changes in wildlife that have been observed over certain periods of time.

Epidemiological aspects of some of the epizootics encountered in different species of wildlife in the country, such as rinderpest, foot and mouth disease, rabies, anthrax, african horse sickness, and leptospirosis have been discussed. Similarly the parasitic infection as well as diseases among non-human primates have been described.

Studies conducted on the pathological examinations of the morbid materials from non-human primates, ungulates, carnivores and other widdlife, received in the Division of Pathology of Indian Veterinary Research Institute, Izatnagar, from different Zollogical parks etc. for investigation and diagnosis of these conditions in wildlife have been carried out sinece 1972. While most of the syndromes may be responsible for sporadic cases and tissue damage in vital organs such as lungs, kidneys, liver, etc. (characterised by pneumonia, hepatitis, nephritis, etc.), some of the diseases such as canine distemper and feline viral enteritis can prove extremely dangerous for wildlife members of dog

and cat families which are susceptible to these diseases and may suffer from heavy mortality rates.

The available information on the reported occurrence of a number of epizootics which were responsible for heavy mortality among different species of already declining wildlife populations during the past several decades clearly points to the urgent need for effective measures to minimise losses from these diseases. This in turn would necessitate surveys of wildlife to determine the prevalence of disease in different species of wildlife and investigations to elucidate the nature of relationships between the domestic livestock and the wildlife which facilitate the spread of diseases between them. Some insight into the diseases of free living wildlife can be gauged also by extending these studies on captive animals in the zoological gardens and limited colonies maintained for biomedical research .

It is of utmost importance that animal disease surveillance and monitoring is scrupulously carried out in the core area of wildlife sanctuaries and national parks besides strict quarantine and prophylactic measures. Moreover, a strict watch has to be kept on domestic animals in grazing area in the forests surrounding the core area of wildlife sanctuaries and national parks to safeguard aginst spread of infection through domestic animals.

28

A CONTRIBUTION TO THE ECOLOGY OF INDIAN PIED MYNA (STURNKS CONTRA CONTRA LINN)

PART-II : BREEDING BIOLOGY

A.K.Tyagi and B.S.Lamba

The studies on the breeding biology of Indian Pied Myna were carried out in and around Dehradun during 1974-1976. This species was found to breed from late February to August end. During these studies most of the active nests were observed in March through August. With the commencement of the breeding season the large flocks of the species start breaking up into pairs. The terrirory is announced by the male a little prior to the pair formation stage and is defended by both sexes. The selection of nest site appears to be mdde by mutual consent. The nest is constructed mostly in branches of trees approximately 5 to 20 metres in hight from the ground. Occasionally a nest may be placed on electric or telephone pole. Both sexes bring nesting materials and take part in the construction of the nest. The share of the female being much larger (75%) than that of the male (25%). The finished nest is a rough dome, app. 60-80 cms wide and app. 35 to 50 cms high. It is made of slender twigs on the outside and lined by softer materials. Generally four to six eggs are laid at the interval of twenty four hours. In 81.6% of the nests the eggs were laid in the early forenoon and in 16.1% of the nests the eggs were laid during the afternoons. Out of the 172 clutches studied 36.05% consisted of 4 eggs each, 41.44% consisted of 5 eggs each and 21.49% consisted of 6 eggs each. The larger clutches were mostly met with in the beginning of the breeding season and the smaller ones in

the later half of the breeding season. Average weight of 60 eggs worked out to be 4,981 grams. Incubation does not start with the laying of the 1st egg and is deffered till the 2nd or 3rd egg is laid. Most of the incubation is done by the female. The male generalyy performs the security duties while female is incubating. The young hatch out in 14 days. Hatching success in 20 nests studied during a period of two years averaged 82.3%. The freshly hatched youngs are nidicolous and are fed by both the parents on insect larvae, soft bodied insects and spiders etc. As many as 35 feeding trips an hour by both parents were clocked in an six-hour observation period. Freshly hatched young weigh slightly (average of hirty two = 0.512 grams) less than the egg's weight before hatching. Average weight of 32 nestlings was found to be 5.632 grams. The nestlings gain weight very quickly. Average individual weight gain recorded in 17 nestlings was 4.371 grams per day in the first week, 3.889 grams in the second and 3.473 grams in the third. Average individual weight of nestling shortly before leaving the nest was recorded to be 78.415 grams. The eyes of the nestlings open on 7th/8th days. Fear complex develops in the youngs when they are about 9 days old. The parent recognition appears to be purely audiovisual. The nestling period is 21 to 26 days. Two broods may be raised in quick seccession. Nestling success worked out to be 42.35% approximately.

29

BREEDING BIOLOGY OF THE BULBULS, PYCNONOTUS CAFER (LINNAEUS) AND PYCNONOTUS LUTEOLUS (LESSON)(FAMILY PYCNONOTIDES, CLASS AES) WITH SPECIAL REFERENCE TO THE MODE OF ECOLOGICAL ISOLATION

V. S. Vijayan

Gause's Hypothesis (1934) that congenetic, sympatric species with idential ecological requirements cannot co-exit in the same area, has been tested and found true for a variety of bird species in Europe, America and parts of Australia (Lack, 1973). However, in India no serious studies on this aspect has so far been done except in the Vultures of Gir Forests (Grubh, 1974).

Ecological isolation in the two species of bulbuls, P. cafer and P. luteolus was investigated by me and in the present paper the mechanism of isolation while breeding is dealt with. No detailed investigation on the breeding biology of these bulbuls has been done before.

The study was conducted at Point Calimere Wildlife Sanctuary (10°18'N, 70°51'E) situated at a low promontory about 4 metres above sea level on the Coromandel coast in Tamil Nadu from November 1971 to February 1974. The area has a prolonged dry season and gets most of its rain from the North-East monsoon. The vegetation is typical of tropical dry evergreen forest (Champion 1936).

The overall breeding season for Pycnonotus cafer and Pycnonotus luteolus extends from August to March with two uncertain peaks, one in October and the other in February.

The availability of caterpillars to Pycnonotus cafer and fruits to Pynnonotus luteolus is the most important factor associated with the initiation of breeding season. Breeding season is the same for both when these requirements coincide, but dissimilar when they occur in different periods. Both the species prefer thorny plants to thornless ones for nesting. Pycnonotus cafer's nests are at slightly higher levels than P. luteolus. The former rests the nests on branches while the latter hangs them between two twigs like a hammock. The nest is cup-shaped or hemispherical in P. cafer whereas this is irregular in shape, either a shallow cup or more or less oval in P.luteolus. Clutch size is two in P. luteolus whereas this is three in P. cafer, variation occurs according to food availability. In the evolution of clutch size the capacity of the nest has a definite influence and also the predation aspect. Overall breeding success is 8% in P. cafer while this is 13% in P. luteolus. Major egg and nestling loss is due to predation - Mangoose are the major predators of nestlings. Ecological isolation is effected mainly by the preference of each species for a different part of the bush for nesting and the use of different nesting material.

30

STATUS OF INDIAN CROCODILIANS

Romulus Whittaker and J.C. Daniel

The three Indian crocodilians are seriously depleted. Hide-hunting and habitat loss are the main reasons for their

rapid disappearance since the 1950's. The mugger (Crocodylus palustris) is still widely distributed but survives only in pockets. The gharial (Gavialis gangeticus) is restricted to the northern rivers and perhaps no more than 100 remain in the wild. The estuarine crocodile (Crocodylus porosus) is extinct in South India and is now found only in Orissa, Bengal and the Andaman and Nicobar Islands.

Though crocodilians often lay 40 or more eggs it is estimated that barely 1-2% of the vulnerable young survive. This natural mortality combined with the imposed activities of man (dams, drainage, diversions pollution, hunting, disturbance) has brought our crocodilians to their present endangered position.

The export of crocodile skins was finally brought under control in 1969. The 1972 wildlife act put the 3 crocodilians into the Schedule I (fully protected) category, although several states took 3 more years to ratify the Act.

Looking at crocodilian status state by state, Tamil Nadu and Gujarat apparently have the largest mugger populations. Orissa has the largest population of estuarine crocodiles on the mainland (at Bhitar Kanika Sanctuary) and the Andamans and Nicobars have a substantial population. Uttar Pradesh has the largest single concentration of gharial (about 20 adults) on the Girwa River. Other states have either a few pockets of mugger, a few individual gharial or no crocodilians at all.

Sri Lanka still has a considerable mugger and estuarine crocodile population but Burma, Bhutan, Pakistan and Bangladesh have very few crocodilians left, due to the same reasons stated for India. Nepal has the second largest concentration of gharial with a total of about 50 for the whole country.

The main crocodilian conservation project is a Government of India and FAO/UNDP rehabilitation project under the consultancy of Dr.H.R.Bustard. The project has been underway since 1974 and already over 1000 baby gharial are being reared for release and 4 sanctuaries formed for them in Rajasthan, U.P., Bihar and Orissa. Estuarine crocodiles are being reared in Orissa and Andhra Pradesh and mugger in Tamil Nadu for eventual release into protected habitat.

The Madras Crocodile Bank co-sponsored by the Madras Snake Park Trust and World Wildlife Fund was initiated in 1974 and has had 3 years of breeding success with mugger. Young crocodiles have already been supplied to the Forest Departments of Orissa, Kerala and Tamil Nadu. It is a conservation oriented project which seeks to help rehabilitate wild crocodilian populations, educate the public and carry out surveys and studies on these reptiles.

Crocodiles can pay their way to survival by being recognized as farmable and/or manageable resources. Their value ecologically and aesthetically will not be appreciated soon enough to guarantee their survival. Their economic value as a potential resource is something everyone can appreciate, the days of domesticated crocodiles may be close at hand!